

Ch. 2 Test

Limits

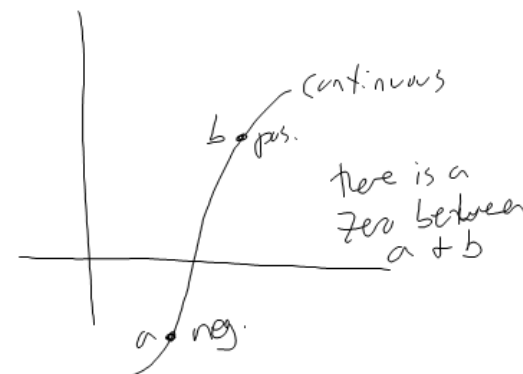
- one vs. two-sided
- properties
- reasoning through
- Solving graphically
- Solving numerically
- Solving analytically
 - remember substitution
 - remember conjugates for sq. root
 - remember $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$
- infinite limits
- asymptotes

Continuity

- 3 parts
 - $\rightarrow f(c)$ exists
 - $\rightarrow \lim_{x \rightarrow c} f(x)$ exists
 - $\rightarrow \lim_{x \rightarrow c} f(x) = f(c)$
- Diff between continuous function and continuous over interval or at a point
- Removable & non-removable discontinuity
- compositions
- Intermediate value theorem

Misc.

- End behavior
- Horz. Asymptotes
 - $\frac{N(x)}{D(x)}$ t = top power
 - b = bottom power
- ① $t > b$ no horz. asympt.
- ② $t < b$, $y=0$
- ③ $t=b$, ratio of leading coefficients
- tangent lines
- normal lines



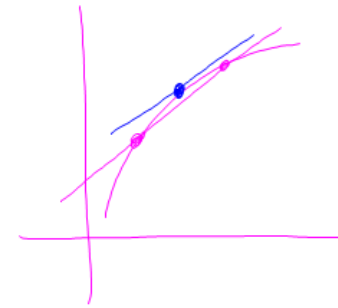
Look over 2.4 #15, 17, 29

$$f(x) = \underline{\underline{2 - 2x - x^2}}$$

$$\begin{aligned} f(x+h) &= 2 - 2(x+h) - (x+h)^2 \\ &= 2 - 2x - 2h - (x^2 + 2xh + h^2) \end{aligned}$$

$$\underline{\underline{= 2 - 2x - 2h - x^2 - 2xh - h^2}}$$

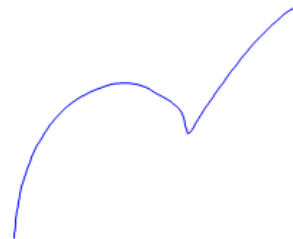
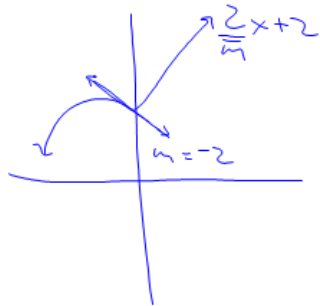
$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \text{Slope of tangent line}$$



$$\underline{\underline{\cancel{2} - \cancel{2}x - \cancel{2}h - \cancel{x^2} - 2xh - h^2 - \cancel{2} + \cancel{2}x + \cancel{x^2}}}$$

$$\frac{\cancel{-2h} - \cancel{2xh} - \cancel{h^2}}{h} = -2 - 2x - h$$

$$\begin{aligned} \lim_{h \rightarrow 0} -2 - 2x - h \\ = \boxed{-2 - 2x} \\ \text{slope} \end{aligned}$$



$$f(x) = \frac{1}{x}$$

$$f(x+h) = \frac{1}{x+h}$$

$$\frac{f(x+h) - f(x)}{h} \Rightarrow \frac{\frac{1}{x+h} - \frac{1}{x}}{h}$$

$$\frac{\frac{x}{x} \cdot \frac{1}{x+h} - \frac{1}{x} \cdot \frac{(x+h)}{(x+h)}}{h} \Rightarrow \frac{\frac{x}{x(x+h)} - \frac{(x+h)}{x(x+h)}}{h} = \frac{\frac{x - x - h}{x(x+h)}}{h}$$

$$= \frac{\cancel{-h}}{x(x+h)} \cdot \frac{1}{\cancel{h}} = -\frac{1}{x^2 + xh} \Rightarrow \lim_{h \rightarrow 0} -\frac{1}{x^2 + xh} = \boxed{-\frac{1}{x^2}}$$

$$f(x) = \frac{4-x}{4} = 1 - \frac{1}{4}x$$

HW • Do the ch. 2 Review - you pick

• Be prepared to turn in all work

★ • Bring ch. 2 Questions